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ESR study of the anisotropic exchange in the quasi-on--dimensional antiferromagnet Sr2V3O9

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Abstract

The chainlike spin-1/2 antiferromagnetic vanadium oxide compound Sr 2V3O9 is studied by electron spin resonance (ESR) with special attention to the space distribution of the Dzyaloshinskii-Moriya (DM) vector along magnetic chains. The angular variation and the temperature dependence of the ESR linewidth is measured in two different planes of a single crystal in the temperature range 4.2-500 K. The ESR data interpretation is based on the combined application of the standard ESR theory for low-dimensional systems and an updated theory using a hidden symmetry in the antiferromagnetic spin-1/2 chain model with the staggered DM interaction. As a result, a DM interaction with a more general (nonstaggered) spatial distribution of DM vectors is claimed to be responsible for the magnetic properties of the chainlike system Sr2V3O 9.